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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/738,688	12/15/2000	Hari B. Sunkara	CL-1482 US NA	9965

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WILMINGTON, DE 19805

EXAMINER

ZEMEL, IRINA SOPHIA

ART UNIT	PAPER NUMBER
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1711

DATE MAILED: 08/10/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/738,688

Applicant(s)

SUNKARA ET AL.

Examiner

Irina S. Zemel

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 March 2004.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-49 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-49 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 7/9/01, 8/13/01.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☒ Other: See Continuation Sheet.

Continuation of Attachment(s) 6). Other: IDS filed 1/19/01, 1/7/02, 4/16/02 and 2/21/03

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 33, 39-43 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 33 recites the limitation "the reaction mixture". There is insufficient antecedent basis for this limitation in the claim.

Claims 36 is confusing because it is not clear whether the clause "the process is carried out with the 1,3-propanediol and it has a purity of 99%" refers to "the 1,3-propanediol" as to "the 1,3-propanediol reactant" recited in claim 1. It is further not clear what is meant as "carried out", i.e., whether it means that the 1,3-propanediol is used as the claimed reactant or whether it is an additional step/component of the process. Further, it is not clear what is referred to as "it" that has 99% purity.

Claim 37 is not a proper and complete sentence and it does not make sense.

Claim 39 recites "condensing 1,3-propanediol to form oligomer or prepolymer of 1,3-propanediol having a degree of polymerization of 2-9 or a mixture containing one or more thereof". It is not understood how a mixture can contain "one" component. Furthermore, the clause "or a mixture containing one or more thereof" is unclear to its meaning. Generally, in any condensation

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reaction (unless it can be controlled to produce a polymer with polydispersity of 1.0) the product of polycondensation contains a mixture polymer chains with different degree of polymerization. Applicants are required to provide clarification whether they claims encompass mono-dispersed condensation product, and how exactly the clause "or a mixture containing one or more thereof" limits the claim.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-6, 9-14, 16, 20, 21, 22, 37, and 44 rejected under 35

U.S.C. 102(b) as being anticipated by US Patent 3,326,985 Mason et al (hereinafter "Mason").

Mason discloses a process of manufacture of polymethylene ether glycol (3G polyol). The product (3Gpolyol) is prepared by providing 1,3-propanediol reactant, precondensing it at the atmospheric pressure and then further condensing it at very low pressure (1 to 8 mm) at a temperature of above 150 and below 250 C. The resulting 3G polyol has a number average molecular weight os about 1200-140. See illustrative example 1.

For the purposes of this rejection claim 1 is interpreted so that it can include a step of pre-condensing the 1,3-reactants at the atmospheric pressure

and followed by the step of further polycondensing the reactants according to the claimed step (b). This interpretation is consistent with the disclosure stating that:

"In one preferred embodiment, the process of the present invention is carried out in a two-stage batch mode wherein the first stage is condensation carried out at about one atmosphere and the second stage is polycondensation carried out at reduced pressure. The first stage condensation reaction is carried out at about one atmosphere in order to avoid losing 1,3-propanediol due to application of a vacuum. The first stage of the reaction is carried out in order to convert some or all of the 1,3-propanediol to oligomers or prepolymers, preferably oligomers (dimer and trimer), which due to their higher boiling points are not removed by vacuum. The second stage is polycondensation of 1,3-propanediol reactants, preferably the oligomers." See paragraph bridging pages 6 and 7.

Furthermore, this interpretation is consistent with claims 3, 4, 36 and 37 claiming 90 % 1,3-propanediol mixture as the 1,3-propanediol reactant or 99 % pure 1,3-propanediol as the 1,3-propanediol reactant. The specification does not provide any enabling disclosure for polycondensing pure of 90% pure 1,3-propanediol monomer at reduced pressure. All illustrative examples employing 1,3-propanediol monomer disclose a pre-condensation step conducted at the atmospheric pressure. Therefore, interpretation of claim 1 as discussed above is consistent with the disclosure, and the invention as claimed in claims 1-6, 9-14, 16, 20, 21, 22 is anticipated by Mason.

Claim Rejections - 35 USC § 102/103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 26-28, and 31 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Mason.

The disclosure of the Mason reference is discussed above. The reference does not address the physical properties of the resulting polymer such as its color and the amount of cyclic oligomers. However, it is reasonably believed that the disclosed polymer inherently exhibits the claimed properties because the 3G polyol disclosed by Mason is obtained substantially by the same method as claimed by applicants. The burden is shifted to the applicants to provide factual evidence to the contrary.

Claim Rejections - 35 USC § 103

Claims 1-49 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 5,403,912 to Gunatillake et al (hereinafter "Gunatillake").

Gunatillake discloses a process for manufacture of various polyether glycols involving steps of providing a reactant diol compound and polycondensing the diol. Among suitable diol compounds diols with 2 to 20 carbon atoms are disclosed in column 3, lines 26-32. From the disclosed genus of diols, claim 1,3-propanediol with three carbon atoms would have been an obvious choice of an ordinary artisan with reasonable expectation of adequate results. In illustrative example 4 the reference discloses preparation of a polyether glycol in a two-step process – first step of pre-condensing a diol at the atmospheric pressure followed by the second step of condensation of the pre-polymer at reduced pressure. The polymer obtained by the process including the second step of polymerization under vacuum exhibit the higher molecular weight and lower Mw/Mn at the end of

polymerization as compared to the product obtained in illustrative example 1 for the same starting diol. Further, the time to complete the reaction is significantly shortened as compared to the reaction carried out at the atmospheric pressure. While the exemplified reaction with the condensation step under vacuum is carried out with 1,8-octanediol as the starting material, use of 1,3-propanediol instead of exemplified 1,8-octanediol would have been obvious, as discussed above, in view of the disclosure in column 3, lines 26-32 stating that the disclosed process can be carried out for any C3-C20 diols, and further to realize the advantages of the vacuum polymerization step for all suitable diols. The polycondensation is carried out at temperatures of about 130 to 220 C and the resulting product has a molecular weight of from 150 to 10,000 as discussed in column 3, lines 47-58. The reduced polycondensation pressure disclosed in example 4 is about 100 mm Hg. Further reduction of pressure would have been obvious for an ordinary artisan to change the reaction kinetics since it is well recognized in the art that parameters such as temperature and pressure are result effective variables in kinetics of any chemical reaction. Thus, absent showing of unexpected results that can be attributed to specifically claimed pressures and temperatures, the claimed pressure and temperatures (in both steps) would have been obvious.

The reference teaches in example 4 that the degree of polymerization of the polymer after precondensing step and after 1.5 hours of condensation in vacuum is about 5 ($M_n=750$ for 1,8-octanediol, see table 1). Therefore, it is reasonable believed that before the vacuum polymerization step, the degree of polymerization is even lower, and the reaction mixture inherently contains dimmers and trimers. The reference is silent to the degree of purity of the starting diols, thus implying that commonly available raw materials of any purity (and polyols of high purity are commonly and commercially available from a number of sources such as DuPont) would have been suitable for the disclosed process, absent showing of unexpected results that can be attributed to specified purity of the product.

The reference further teaches purifying the final product to a desired polydispersity and functionality. See results in tables 1 and 2. The reference teaches that various copolymers can be obtained by mixing various diols. See column 4, lines 3-8.

The reference does not disclose physical characteristics of the resulting product, such as its color and the amount of cyclic oligomers. However, it is reasonably believed that the disclosed polymer inherently exhibits the claimed properties because the polyols disclosed in the reference are obtained substantially by the same method as claimed by applicants. Furthermore, the reference explicitly states that the disclosed process allows for production of polymers with good color and does not produce undesired by-products. See

column 3, lines 47-58. The burden is shifted to the applicants to provide factual evidence to the contrary.


The invention as claimed, therefore, would have been obvious from the disclosure of the Gunatillake reference absent showing of unexpected results.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Irina S. Zemel whose telephone number is (571)272-0577. The examiner can normally be reached on Monday-Friday 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James Seidleck can be reached on (571)272-1078. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ISZ


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